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(57) Abstract: The present invention relates to a method and apparatus for the production of titanium alloys and titanium-aluminium inter-metallic compounds and alloys. Starting from a precursor material including titanium subchloride (titanium trichloride or titanium dichloride), the precursor material is reduced by aluminium to produce titanium-aluminium intermetallic complexes or alloys and aluminium chloride which is driven away from the reaction zone so as to favour the forward reaction and the production of the titanium-aluminium compounds. Starting from a precursor material of titanium subchloride avoids the problems associated with starting from titanium metal (which is expensive to produce) or titanium tetrachloride (a reaction very difficult to control), and results in the production of powdered forms of titanium-aluminium compounds with controllable composition.